5.1 Static Electric Charges

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History:

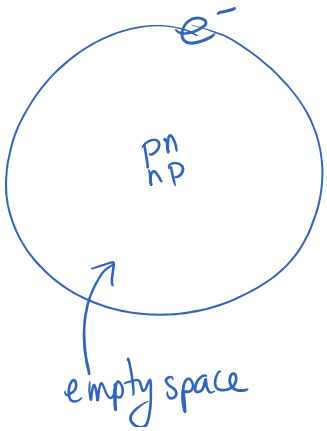
- amber rubbed with cloth picks up dust
- Greek word for amber = elektron
- in 1500's Gilbert did experiments (England)
- in 1700's du Fay found 2 kinds of electricity (France)
  - attraction and repulsion
- later 1700's Benjamin Franklin pos and neg charges

Science:

- static electricity - when charges on electrified objects are <u>not</u> moving

- Object with
  - same charge repel
  - opposite charge attract
  - neutral charge is attracted to pos. or neg. object.

- the atom: Dalton - indivisible
  Rutherford - nucleus
  Thomson - electron
  Chadwick - neutrons (1932)



$m_e = 1.67 \times 10^{-27}$ kg

$m_p = 1836 \times m_e$

$m_n = m_p + m_e$

$n = p + e^-$ → radioactivity

Hydrogen

$r_{nucleus} = 10^{-15}$ m

$r_{} = 10^{-10}$ m

empty space

$r_{nucleus} = 10^{\ } m$

$r_{atom} = 10^{-10} m$

- ions - atoms that have gained or lost electrons
- some materials gain/lose e^- more easily (pg 160) $\Updownarrow^{-}_{+}$

- Law of Conservation of charge - charge is never created or destroyed.

- Conductor - materials that allow charged particles to pass through them easily
  - silver, copper, aluminum, carbon-graphite
- Insulators - materials that resist the flow of charged particles thru them
  - plastic, rubber, porcelain, carbon-diamonds
  - easier to put static charge on an insulator since charge won't flow away.

- Charging by:
  - conduction - contact (2 objects)
  - induction - no contact (3 objects) (pg 162)